

TICK-BORNE DISEASE - RISKS AND REALITY

BY WENDY FOX



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WHAT ARE TICKS?



Members of the family
Arachnida ('eight-legged').

In same family as spiders,
scorpions, mites and
harvestmen.



Ectoparasites - feeding on the outside of a host's body on the blood of mammals, birds and reptiles.

WHAT ARE TICKS?



Two families of ticks in the UK



Argasidae
Soft tick

WHAT ARE TICKS?



Two families of ticks in the UK



Ixodidae
Hard tick

WHAT ARE TICKS?



Ticks in the UK

Species	Name	Host	Bite risk	Diseases
<i>Argas reflexus</i>	Pigeon tick	Birds	Yes	Yes
<i>Argas vespertilionis</i>	Short-legged Bat tick	Bats and birds	Yes	Yes
<i>Dermacentor reticulatus</i>	Ornate cow tick	Varied	Yes	Yes
<i>Haemaphysalis punctata</i>	Coastal red tick	Varied	Yes	Yes
<i>Hyalomma marginatum</i>	Two-host tick	Varied	Yes	Yes

WHAT ARE TICKS?



Ticks in the UK

Species	Name	Host	Bite risk	Diseases
<i>Hyalomma aegyptium</i>	Tortoise tick	Varied	Yes	No
<i>Ixodes apronophorus</i>	Marsh tick	Water voles	No reports	Yes
<i>Ixodes trianguliceps</i>	Shrew tick	Small rodents	Yes	Yes
<i>Ixodes canisuga</i>	Dog / Fox tick	Foxes, dogs & mustelids	Yes	Yes
<i>Ixodes uriae</i>	Seabird tick	Birds	Yes	Yes

WHAT ARE TICKS?



Ticks in the UK

Species	Name	Host	Bite risk	Diseases
<i>Ixodes hexagonus</i>	Hedgehog tick	Varied	Yes	Yes
<i>Ixodes lividus</i>	Sand martin tick	Martins and Swallows	No reports	Yes
<i>Ixodes ricinus</i>	Sheep tick	Varied	Yes	Yes
<i>Ixodes ventralloi</i>	Rabbit tick	Varied	Yes	Yes
<i>Rhipicephalus sanguineus</i>	Kennel tick	Varied	Yes	Yes

WHAT ARE TICKS?



Ticks in the UK

Species	Name	Host	Bite risk	Diseases
<i>Ixodes acuminatus</i>	Southern rodent tick	Small rodents	Yes	Yes
<i>Ixodes arboricola</i>	Tree-hole tick	Birds	No reports	Yes
<i>Ornithodoros maritimus</i>	Soft seabird tick	Seabirds	Yes	Yes
<i>Ixodes caledonicus</i>	Northern bird tick	Birds	No reports	Yes
<i>Ixodes rothschildi</i>	Puffin tick	Sea and coastal birds	No reports	Yes

WHAT ARE TICKS?



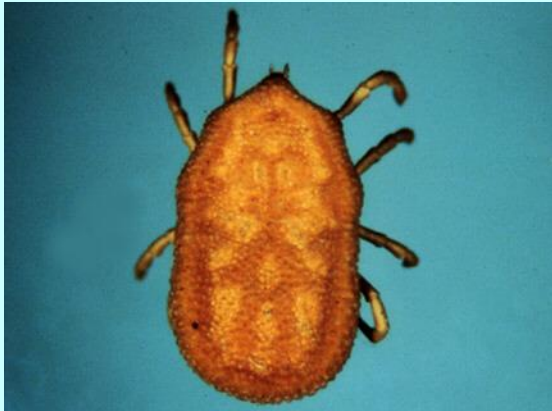
Ticks in the UK

Species	Name	Host	Bite risk	Diseases
<i>Ixodes unicavatus</i>	Cormorant tick	Sea and coastal birds	No reports	Yes
<i>Ixodes frontalis</i>	Passerine tick	Birds	No reports	Yes

WHAT ARE TICKS?



Variations in Appearance



Bat Tick

WHAT ARE TICKS?



Variations in Appearance



Bat Tick

Sheep Tick



WHAT ARE TICKS?



Variations in Appearance



Bat Tick



Sheep Tick

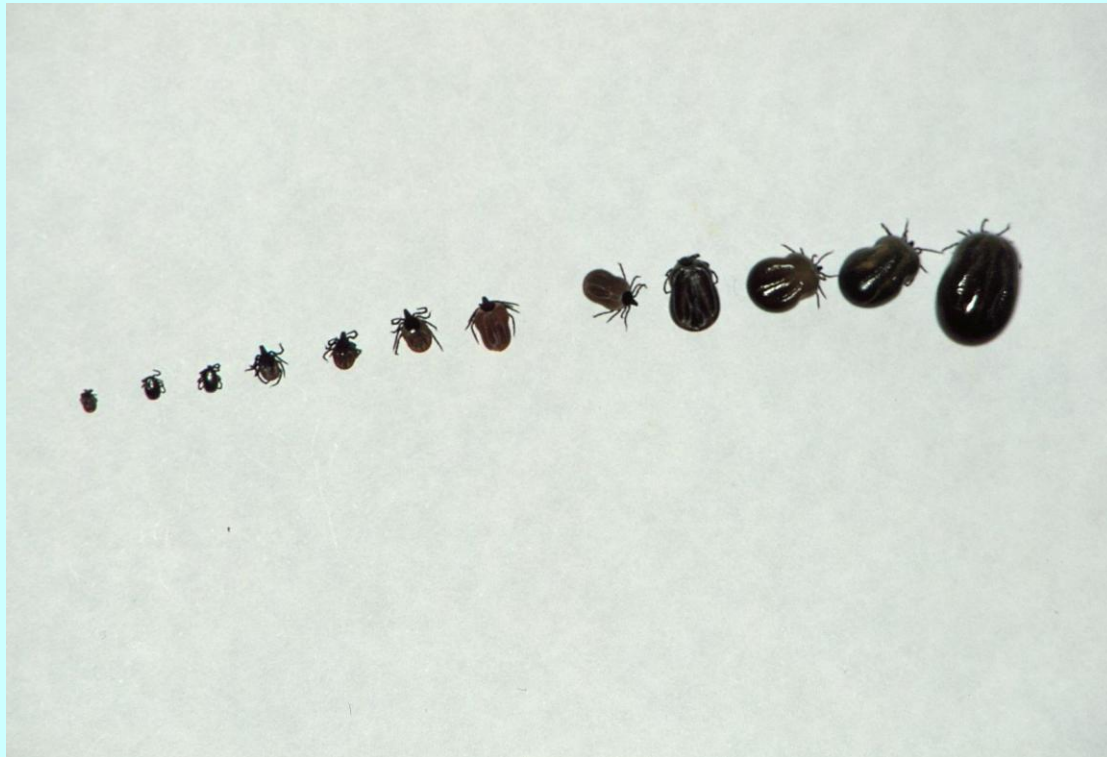


Marsh Tick

WHAT ARE TICKS?



Variations in Appearance



Various stages of engorgement

WHAT ARE TICKS?



Variations in Appearance



Male *I. ricinus*

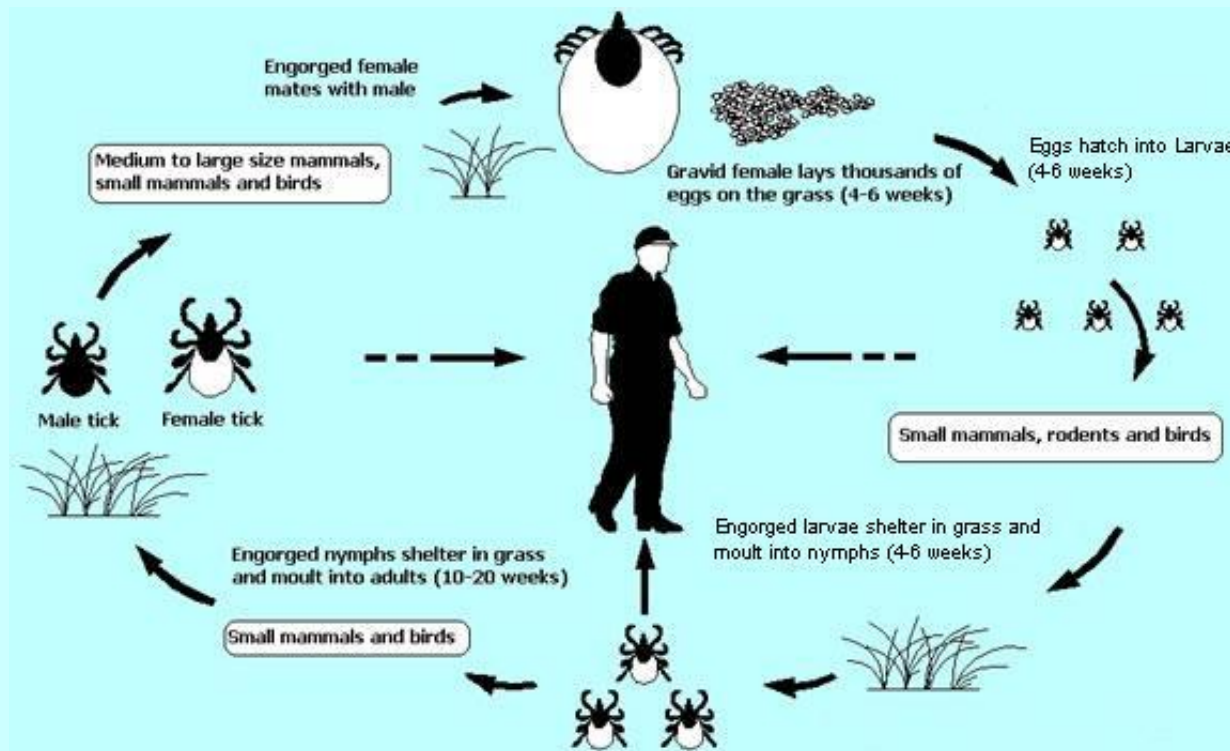


Female *I. ricinus*

Difference between sexes

WHAT ARE TICKS?

Life Cycle



WHAT ARE TICKS?



Why the different host sizes?



Higher humidity close to the ground

WHAT ARE TICKS?



Why the different host sizes?



Higher humidity close to the ground

Encounter smaller hosts



TICK-BORNE DISEASE IN THE UK - TRANSMISSION



TICK-BORNE DISEASE IN THE UK - TRANSMISSION



Tick saliva contains bio-chemicals which:

- Numb the bite area
- Keep the blood flowing
- Prevent inflammation
- Dissolve tissue



TICK-BORNE DISEASE IN THE UK - TRANSMISSION



The likelihood of transmission increases:

- **If the tick is removed incorrectly** (freezing, burning, squashing, scratching an attached tick, or applying solutions, can cause it to regurgitate or spill saliva and gut contents which may contain infective agents)
- **The longer the tick remains attached** (more saliva is pumped into the host to keep the blood flowing, numb the bite area and prevent inflammation)



TICK-BORNE DISEASE IN THE UK - TRANSMISSION



Safe tick removal helps to prevent transmission and should be performed:

- **With fine-nosed tweezers** (to avoid compression of the tick's body)

- **With a tick-removal tool** (designed to avoid compression / regurgitation)



TICK-BORNE DISEASES IN THE UK



- Borreliosis (Lyme disease) - **most prevalent**

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- TBE?

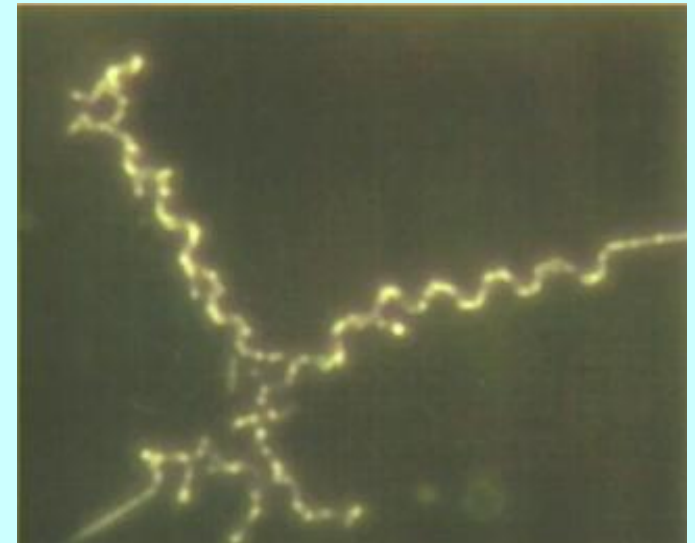
LYME DISEASE – QUICK GUIDE



Borreliosis (Lyme disease or Lyme borreliosis)

Caused by a spirochaetal bacterium of the *Borrelia* genus.

Several species of this organism exist in Europe, most of which can cause disease if transmitted to humans.



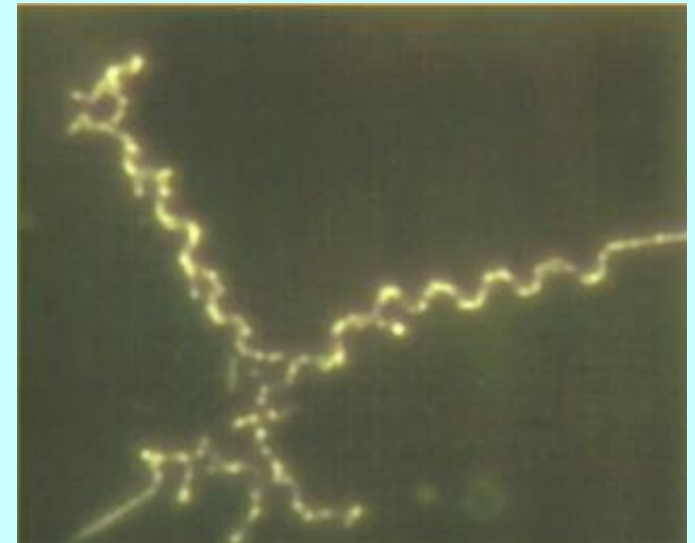
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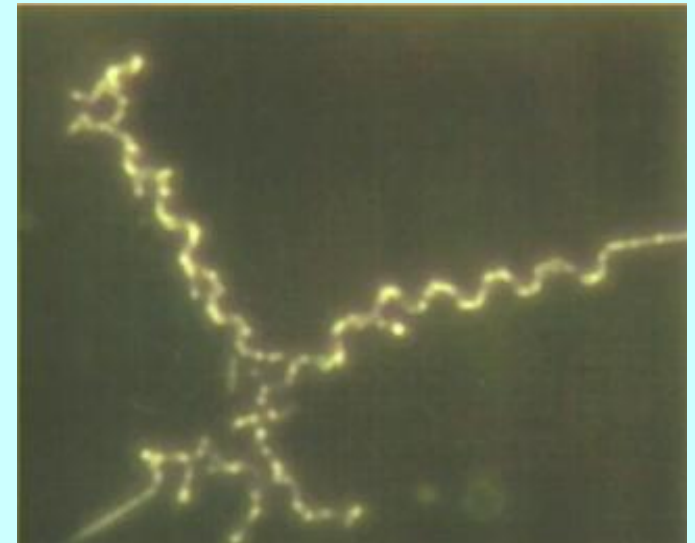


People usually become infected after being bitten by hard-bodied ticks which are infected with *Borrelia* sp. Ticks become infected when they feed on birds or mammals that carry the bacterium in their blood.

LYME DISEASE – QUICK GUIDE



Lyme disease was named after a cluster of cases that occurred in Old Lyme, Connecticut in the United States, in 1974.

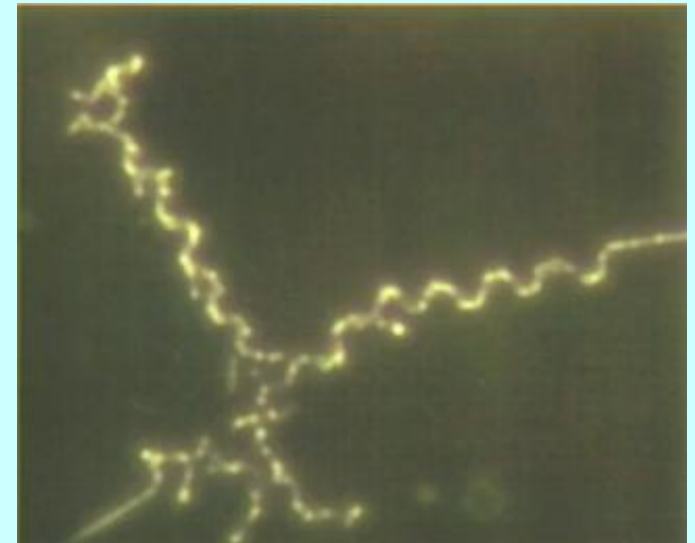


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LYME DISEASE – QUICK GUIDE

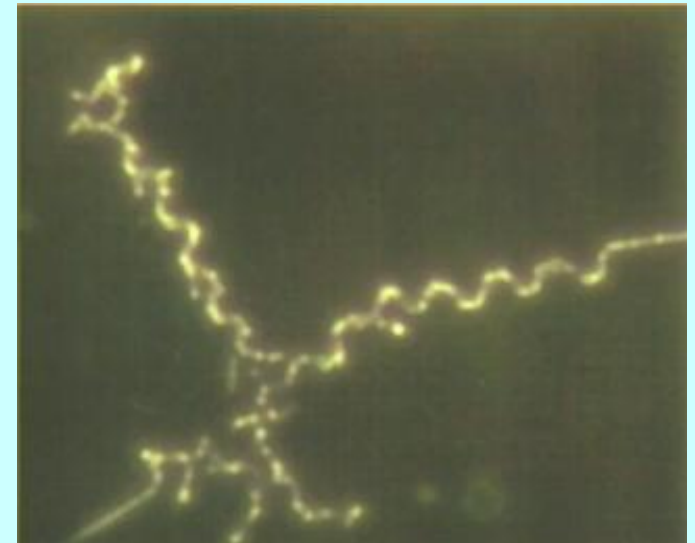


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EM



LYME DISEASE – QUICK GUIDE



Treatment

Treatment in the early, localised phase is usually successful with a few weeks of oral antibiotics (Doxycycline, Amoxicillin or Cefuroxime axetil).

Neuroborreliosis can require intravenous treatment, usually with Ceftriaxone.

Co-infections

Other infections can be transmitted by bites from infected ticks. These include Anaplasmosis, Babesiosis, and Q Fever, although recorded cases of these are rare.

If a tick-transmitted co-infection occurs with Lyme borreliosis (LB) it may give an atypical clinical presentation. Clinicians should be aware of the possibility of co-infections, which may also influence treatment choice.

LYME DISEASE – QUICK GUIDE



Vaccine

There is no LB vaccine currently available in Europe or North America. (A US vaccine was withdrawn in 2002). Ongoing research, but with no product likely in the near future.

LYME DISEASE – QUICK GUIDE



Reporting

Scotland - Lyme disease, Q-fever and Babesiosis are notifiable diseases on the basis of clinical suspicion.

LYME DISEASE – QUICK GUIDE



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England & Wales – an enhanced voluntary monitoring scheme exists. The Health Protection Agency's (HPA) Lyme Borreliosis Unit reports only laboratory confirmed cases of Lyme disease directly to the Zoonoses Surveillance Unit.

LYME DISEASE – QUICK GUIDE



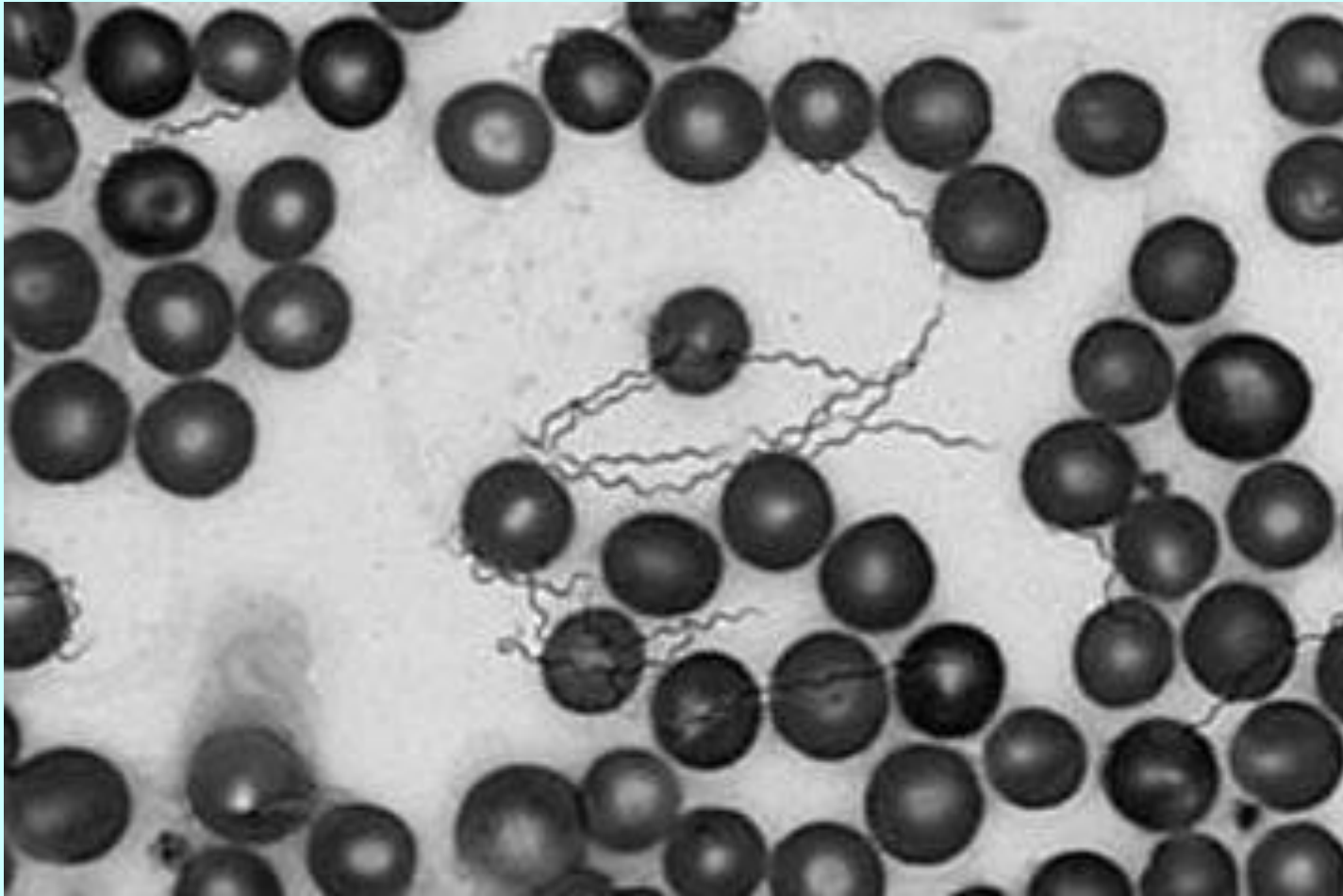
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Occupational-acquired disease - notified to the Health and Safety Executive (HSE). The Reporting of Injuries Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR).

HEALTH CONCEQUENCES, LONG-TERM EFFECTS



HEALTH CONSEQUENCES, LONG-TERM EFFECTS



Long-term Effects of Untreated Borreliosis

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- Acrodermatitis chronica atrophicans (ACA) - can take a chronically progressive course, leading to a widespread atrophy of the skin.
- Other complications affecting the eyes and other organs and tissues can occur.

HEALTH CONSEQUENCES, LONG-TERM EFFECTS



HEALTH CONCEQUENCES, LONG-TERM EFFECTS



To avoid long-term and irreversible effects of infection:



- Early recognition of infection
- Early initiation of treatment
- Careful monitoring during and post treatment

Regional Differences in Approaches

- GPs in highly endemic areas often opt to use a prophylaxis if the tick is heavily engorged or crushed. Many also treat on the basis of suspicious symptoms, before blood-test results.
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- GPs in highly endemic areas sometimes opt to treat even if the test is negative.
- Many GPs with little or no experience of Lyme disease will usually wait until confirmatory blood tests are returned before initiating treatment, and will exclude Lyme disease based on a negative test.

Limitations of Testing

Two-step approach:

1. Antibody screening tests.
2. Immunoblotting (western blotting) of reactive or equivocal samples.

Antibodies may not always be detectable in the first few weeks after infection because an antibody response takes several weeks to develop. A second sample may then show sero-conversion.

Late stage LB patients can still sometimes be seronegative.

Limitations of Testing

People may have antibodies to *Borrelia sp.* without having a current infection (regular occupational or recreational exposure to tick bites).

Other conditions (e.g. Glandular Fever, Syphilis, Rheumatoid Arthritis) can result in false-positive reactions for LB.

***Important to evaluate clinical findings and history of exposure carefully**

MEDICAL ATTITUDES TO DIAGNOSIS



Rashes & Tick Bites – Diagnostic Problems



Classic EM



EM Western Blot +

Rashes & Tick Bites – Diagnostic Problems



Multiple Erythema Migrans

Rashes & Tick Bites – Diagnostic Problems

Only 32% of reported cases had documented Erythema Migrans (HPA 2008).



In some patients, rashes are never observed or may be found hidden.

Only 40% of laboratory confirmed cases reported a tick bite (HPA 2008).

MEDICAL ATTITUDES TO DIAGNOSIS



Differences in Approaches to Treatment

Guidelines (none binding on clinicians)

IDSA (Infectious Diseases Society of America)

Recommendations:

Oral therapy, (Tetracyclines or Amoxicillin), for a period of up to 4 weeks. IV treatment for 2-4 weeks (broad-spectrum Cephalosporin- or Penicillin-antibiotic) advised for neuroborreliosis (except cases of facial palsy / peripheral neuropathy alone).

The authors maintain - “no convincing biological evidence for the existence of symptomatic chronic *B. burgdorferi* infection amongst patients that have received the recommended treatment”.

A continuation of symptoms post-treatment is considered to be "Post Lyme Syndrome“.

Differences in Approaches to Treatment

ILADS (International Lyme & Associated Diseases Society)

Recommendations:

Duration of therapy should be guided by clinical response.

Post-treatment relapses could be the result of persistent infection, or re-infection, and further treatment may be necessary.

In cases of persistent infection, the practice of stopping antibiotics to allow for a delayed recovery is not recommended. In such cases, it is reasonable to continue treatment until clinical abnormalities have resolved and all symptoms have disappeared.

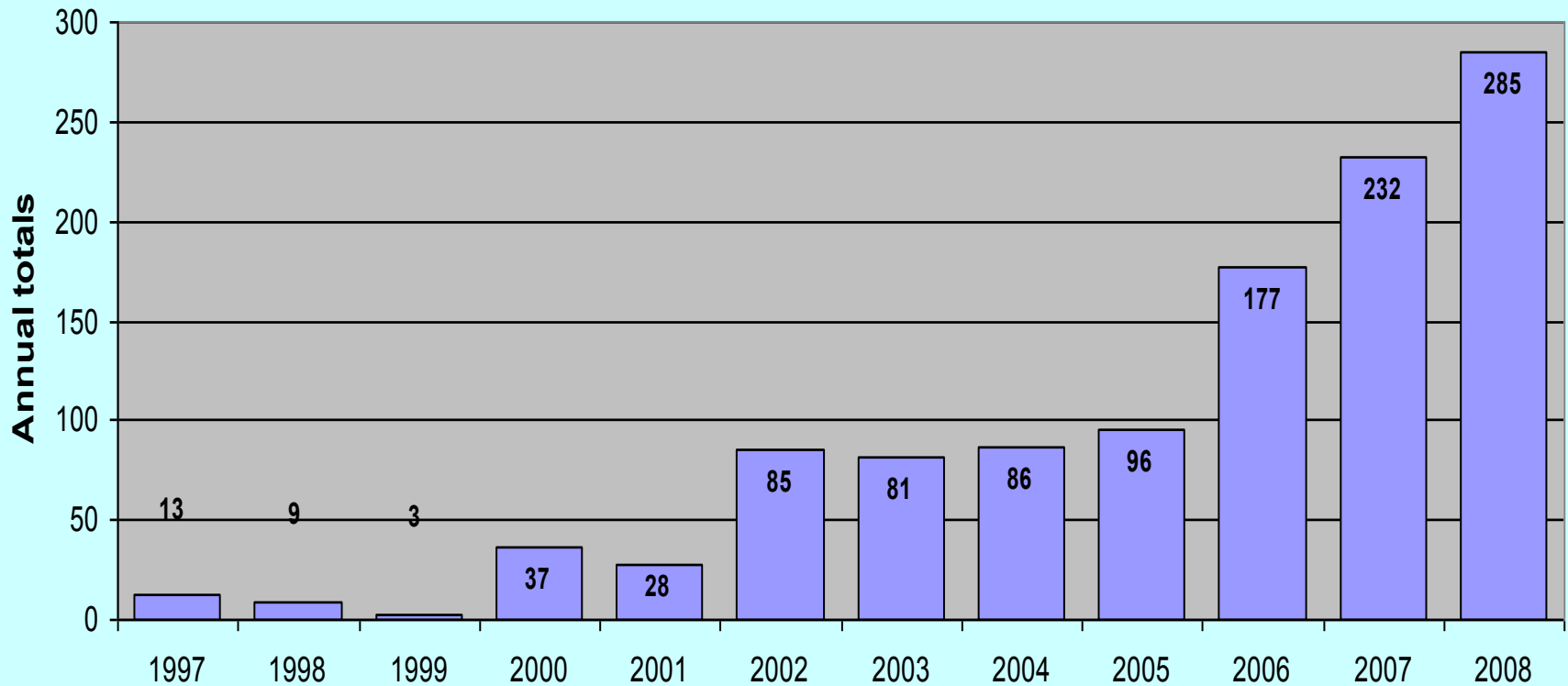
LYME DISEASE PREVALENCE IN THE UK



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Scotland (Health Protection Scotland data)



LYME DISEASE PREVALENCE IN THE UK



Scotland

Many GPs are unaware that they are required to report suspected cases.

Not all Infectious Diseases Departments list LB as a notifiable disease.

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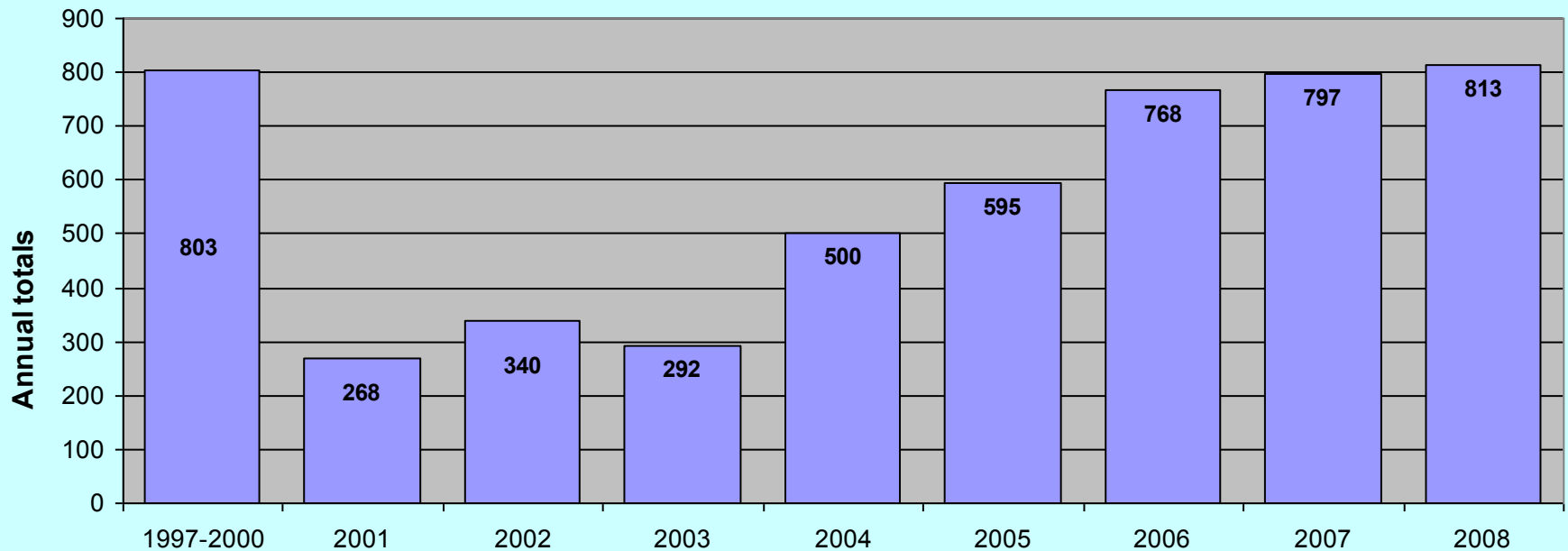
Dr. Darrel Ho-Yen, head of the microbiology department at Raigmore Hospital Inverness, and head of the national Lyme disease testing service, believes that the known number of proven cases should be multiplied by ten:

“to take account of wrongly-diagnosed cases, tests giving false results, sufferers who weren’t tested, people who are infected but not showing symptoms, failures to notify and infected individuals who don’t consult a doctor”.

LYME DISEASE PREVALENCE IN THE UK



England & Wales (Health Protection Agency data)



LYME DISEASE PREVALENCE IN THE UK



England & Wales

Statistics are compiled from laboratory-confirmed cases of LB

HPA:

“Reporting levels have improved, but the data remain incomplete because they do not include cases diagnosed and treated on the basis of clinical features such as erythema migrans, without laboratory tests. It is estimated that between 1,000 and 2,000 additional cases of LB occur each year in England and Wales”.

LYME DISEASE PREVALENCE IN THE UK



England & Wales

Cases have been reported from most counties in England and Wales, but most frequently in Exmoor, the New Forest, the South Downs, parts of Wiltshire and Berkshire, Thetford Forest, the Lake District and the North Yorkshire Moors.

If awareness increased amongst GPs outside these areas, would we see an increase in reported cases?

POTENTIAL FOR THE SPREAD OF LYME DISEASE



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Contributing Factors

- More ticks



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- More ticks
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- Climate change



POTENTIAL FOR THE SPREAD OF LYME DISEASE



Contributing Factors

- More ticks
- More people involved in outdoor pursuits
- Climate change
- Urban sprawl



POTENTIAL FOR THE SPREAD OF LYME DISEASE



Why More Ticks?

- Changes in farming practices:
- Banning of certain sheep dips
- Lack of frequent dipping (cost cutting)
- Lack of bracken / heather management

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Why More Ticks? Climate Change

- Milder winters – allows more ticks to complete their lifecycle faster.
- Earlier leaf unfurling, later leaf drop – allows more host animals to breed more effectively, lower infant mortality = greater number of hosts.

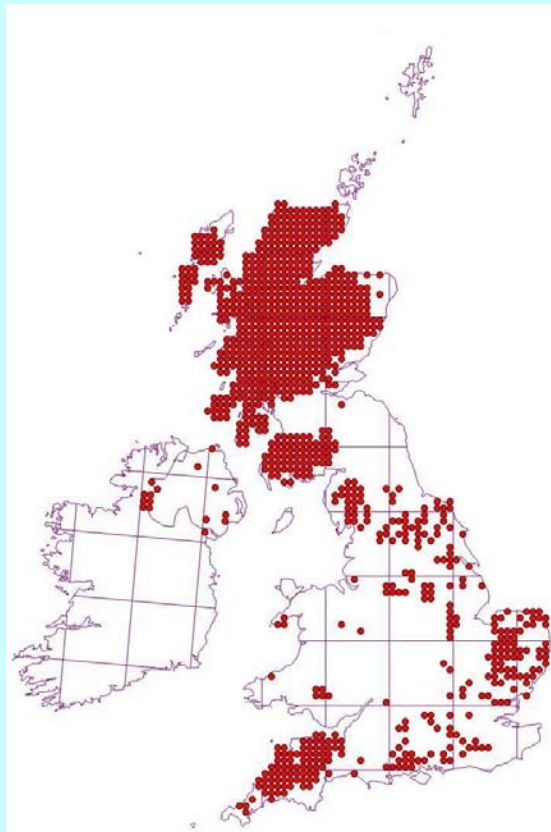


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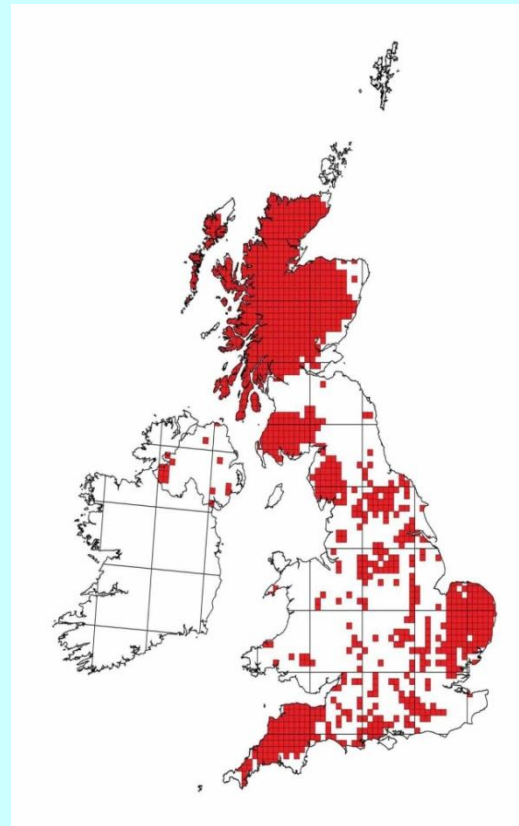
Why more ticks? Host increase



Red deer distribution 2000



2007



Range of expansion most noticeable in the Midlands and East Anglia

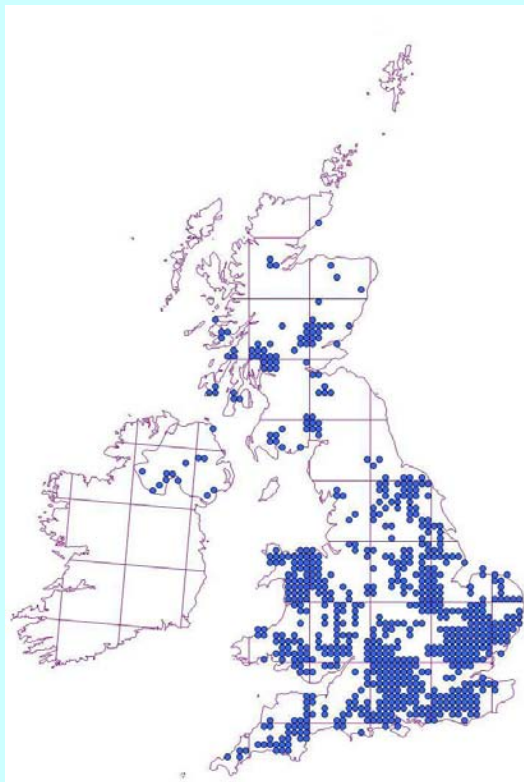
British Deer Society data

POTENTIAL FOR THE SPREAD OF LYME DISEASE

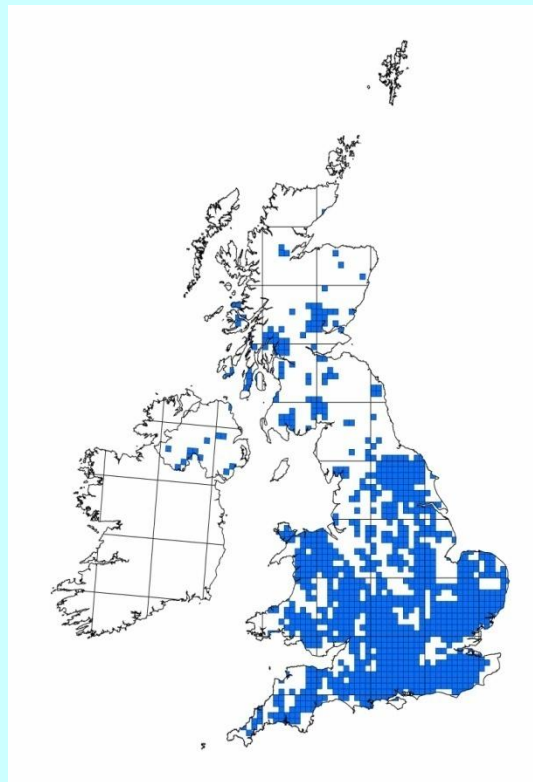
Why more ticks? Host increase



Fallow deer distribution 2000



2007



A steady expansion of Fallow deer has been identified between surveys

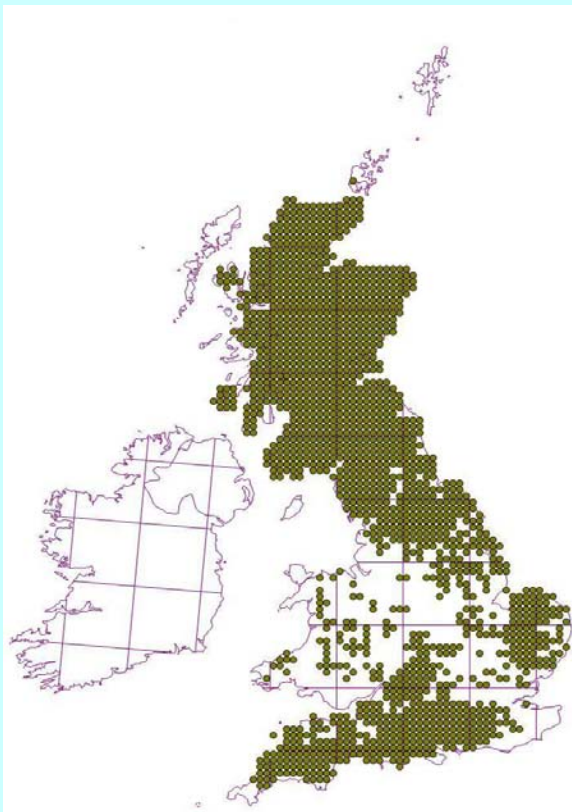
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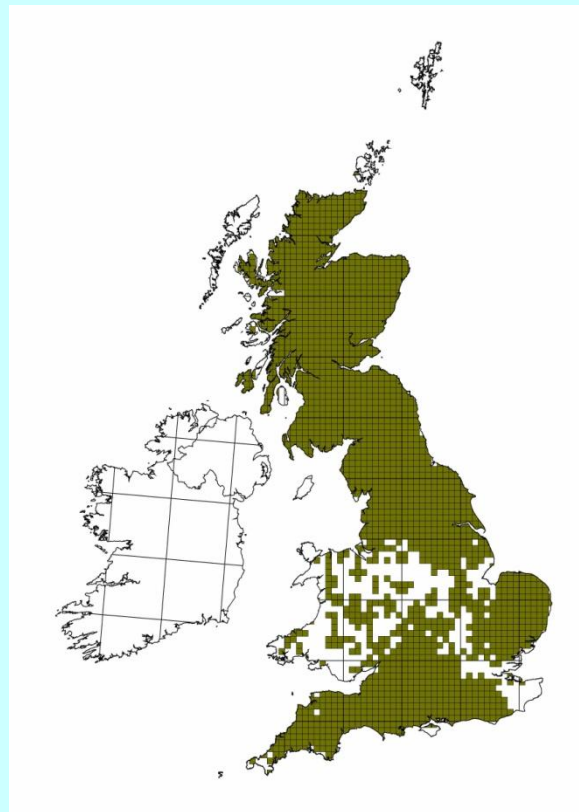
Why more ticks? Host increase



Roe deer distribution 2000



2007



The most widely distributed species of deer, the range increasing within middle England

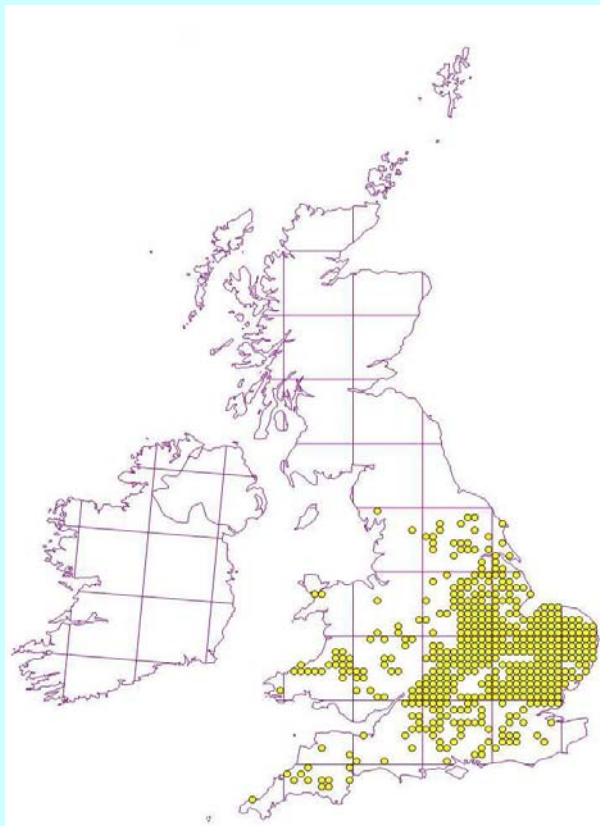
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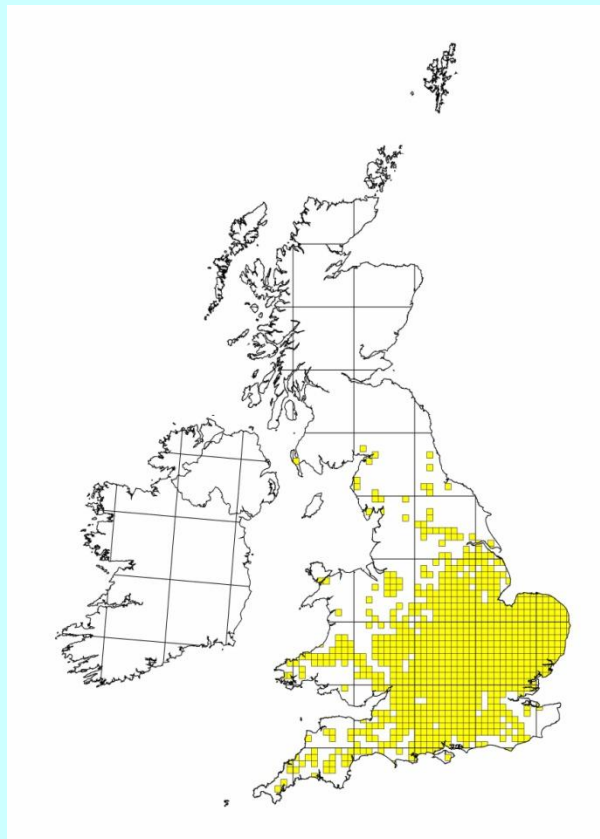
Why more ticks? Host increase



Muntjac deer distribution 2000



2007



Muntjac range expansion has been particularly noticeable since the 2000 survey

British Deer Society data

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife

Foxes

Highly successful at city life –
can host various species of
ticks.



POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife



Badgers

More common in suburban areas – can host various species of ticks.

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife

Hedgehogs

Carries the tick *Ixodes hexagonus* – most common to infect domestic pets.



POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife



Pigeons

Harbour Argas reflexus (soft tick), which can transmit Borreliosis to people and pets.

Tick infestations have been identified in pigeon roosts in buildings such as Kings College, Cambridge.

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife

Rats

Reports of call-outs for urban rat infestations have increased significantly.

Less frequent refuse collections, recycling centres and fly-tipping helps to support their populations.



POTENTIAL FOR THE SPREAD OF LYME DISEASE



Urban wildlife

New urban animal species

Finding niches in city life – more variation in host species for urban ticks.

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Potential threat to:



- The homeless

POTENTIAL FOR THE SPREAD OF LYME DISEASE



Potential threat to:



- The homeless
- People involved in rural and urban leisure activities

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- The homeless
- People involved in rural and urban leisure activities
- Employees, such as park maintenance workers
- Workers in industrial units near scrubland



No licensed chemical control



Methods currently employed



Sheep

Pour-on acaracides used regularly help mop up ticks

Ticks die on contact with the treated fleece

Methods currently employed

Bracken

Controlling bracken helps
reduce local tick densities



Methods currently employed



Heather

Burning kills ticks and eggs on the ground

Experimental methods



Deer treatment bait stations

Visiting deer are treated with
acaricide

SUMMARY

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- ✓ **Ticks are more abundant** (an increase in population and distribution)
- ✓ **People are in tick habitat more often and for longer periods**
- ✓ **Awareness is the ONLY defence** (no vaccines)
- ✓ **Healthcare workers need to be more aware** (correct tick removal, recognition of potential infection and prompt treatment)

THANK YOU AND REMEMBER
TICKS CAN MAKE YOU SICK!

Tick-removal
and repellent
products, and
awareness
merchandise
are available
from our
website



BADA-UK
PO Box 544,
Wath upon
Dearne,
Rotherham
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Leaflets, posters and other literature are available free-to-download from
www.bada-uk.org